UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,790	07/27/2005	Peter Bassler	264390US0PCT	1961

22850 7590 08/08/2007

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
GALLIS, DAVID E	

ART UNIT	PAPER NUMBER
1625	

NOTIFICATION DATE	DELIVERY MODE
08/08/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No.	Applicant(s)	
	10/521,790	BASSLER ET AL.	
	Examiner	Art Unit	
	David E. Gallis	1625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-30* is/are rejected.

7)☐ Claim(s) *17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/21/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 11 through 30 are pending. Claims 1 through 10 have been canceled. Applicant's claim to foreign priority of 102 33 383.1 (Germany) filed July 23, 2002 is acknowledged.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 11 through 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rust et al. (US 2001/0052453 A1, pub date December 20, 2001) and in further view of Schutte et al. (US 2001/0021784 A1, pub date September 13, 2001) as applied to claims 11 through 23 above.

Claim 11 is drawn to a process for the intermediate isolation of the oxirane formed by reaction of a hydroperoxide with an organic compound, wherein the product mixture of the reaction is fractionated into three boiling fractions using a diving wall column with the oxirane taken off in the intermediate boilng fraction at the side offtake and the hydroperoxide taken off in the high boiling fraction at the bottom of the column. Claim 12 recites the limitation of claim 11 that the dividing wall column comprise at least two thermally coupled distillation columns. Claims 13 through 16 and 18 recite the limitations of claim 11 that the dividing wall column operate at a pressure from 0.5 to 5 bar, the side offtake temperature is from 10 to 60°C, the dividing wall column has from

10 to 70 theoretical plates, and that the key components in the purified oxirane be less than 5% by weight. Claim 17 recites the limitation of claim 11 that the product mixture comprising the oxirane is prepared by a process comprising at least (i) reacting the hydroperoxide and the organic compound with an isothermal fixed-bed reactor to give a mixture of reacted organic compound and unreacted hydroperoxide, (ii) separating the unreacted hydroperoxide resulting from (i), and (iii) reacting the hydroperoxide from (ii) with the organic compound with an adiabatic fixed bed reactor. Claim 19 through 23 recites the further limitations of claim 11 that the hydroperoxide used be hydrogen peroxide and the organic compound be brought into contact with a heterogeneous catalyst during reaction, the heterogeneous catalyst comprising zeolite TS-1, the organic compound used is propylene and the oxirane is propylene oxide.

Rust et al. teaches all the elements and principles of the dividing wall distillation column. Clearly, Fig. 1 teaches diagamatically the introduction of a multicomponent mixture to the dividing wall system and the side off take of the intermediate-boiling fraction as well as the bottom offtake of the high boiling fraction (see also page 1, ¶0001 and page 2 ¶0032). Rust et al. does not however teach the catalyzed (TS-1) reaction of a hydroperoxide (hydrogen peroxide) with an organic compound (propylene) to form an oxirane (propylene oxide) in a fixed-bed reactor.

Schutte et al. teaches the reaction of hydrogen peroxide and propene (propylene) over a catalytic bed (fixed-bed) of TS-1 in a reactor to form propene oxide (propylene oxide) (see page 2, ¶0019, ¶0030 and ¶0031; page 3, ¶0032).

Clearly, Rust et al. combined with Schutte et al. teach all the functional elements of the instant claims 11, 17, and 19 through 23. It would be obvious to one skilled in the art that the divided wall apparatus and diagrammatic operation taught by Rust et al. is adaptable for the separation of any three component feed mixture that can reside in the vapor phase. Likewise, the reaction catalyzed by TS-1 taught by Schutte et al. can obviously be accommodated by either isothermal execution or adiabatic execution, and would also serve equally well as the reaction framework for the reuse of unreacted hydroperoxide as recited in instant claim 17. Instant claims 13, 14, 15, 16, and 18 all recite operational parameters dictated by the physical properties of the distillates (i.e. pv=nRt) and the design selections known for the dividing wall column. In the instant case the distillates are oxiranes and unreacted hydroperoxides targeted for at least 95% purity of the oxirane fraction at 10 to 70 theoretical plate resolution. Varying these, as well pressure and temperature parameters is obvious to, and standardly employed by, one of ordinary skill in the art for the purpose of routine optimization. This has been recognized as such by case law with In re Aller, Lacey, and Hall, 105 USPQ 233 where the opinion cited "Any chemist reading the article could logically assume that higher yields might be obtainable, and by experimentally varying the conditions ... could find the most productive conditions."

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 24 through 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rust et al. (US 2001/0052453 A1, pub date December 20, 2001) and in further view of Schutte et al. (US 2001/0021784 A1, pub date September 13, 2001) as applied to claims 24 through 28 above.

Claim 24 is drawn to a process for the intermediate isolation of propylene oxide formed by reaction of hydrogen peroxide with propylene, wherein the process comprises at least (i) reacting hydrogen peroxide and propylene to give a mixture of propylene oxide and unreacted hydrogen peroxide in an isothermal fixed-bed reactor, (ii) separating the unreacted hydrogen peroxide resulting from (i) by fractionation in a dividing wall column into three boiling fractions with the propylene oxide taken off in the intermediate boiling fraction at the side offtake and the hydrogen peroxide taken off in the high boiling fraction at the bottom of the column, and (iii) reacting the hydrogen peroxide from (ii) with propylene with an adiabatic fixed bed reactor. Claims 25 and 27 recite the limitations of claim 24 that the dividing wall column operate at a pressure from 0.5 to 5 bar, the side offtake temperature is from 10 to 60°C, the dividing wall column has from 10 to 70 theoretical plates, and that the key components in the purified propylene oxide be less than 5% by weight. Claims 26 and 28 recites the further limitations of claim 24 that the propylene be brought into contact with a heterogeneous catalyst during reaction, the heterogeneous catalyst comprising zeolite TS-1, and that the dividing wall column comprise at least two thermally coupled distillation columns.

Rust et al. teaches all the elements and principles of the dividing wall distillation column. Clearly, Fig. 1 teaches diagamatically the introduction of a multicomponent mixture to the dividing wall system and the side off take of the intermediate-boiling fraction as well as the bottom offtake of the high boiling fraction (see also page 1, ¶0001 and page 2 ¶0032). Rust et al. does not however teach the catalyzed (TS-1) reaction of a hydroperoxide (hydrogen peroxide) with an organic compound (propylene) to form an oxirane (propylene oxide) in a fixed-bed reactor.

Schutte et al. teaches the reaction of hydrogen peroxide and propene (propylene) over a catalytic bed (fixed-bed) of TS-1 in a reactor to form propene oxide (propylene oxide) (see page 2, ¶0019, ¶0030 and ¶0031; page 3, ¶0032).

Clearly, Rust et al. combined with Schutte et al. teach all the functional elements of the instant claims 24, 26, and 28. It would be obvious to one skilled in the art that the divided wall apparatus and diagrammatic operation taught by Rust et al. is adaptable for the separation of any three component feed mixture that can reside in the vapor phase, as the divided wall column is in essence a thermally coupled two column system (see Rust et al., page 1 ¶0001, lines 31 through 32). Likewise, the reaction catalyzed by TS-1 taught by Schutte et al. can obviously be accommodated by either isothermal execution or adiabatic execution of the fixed bed reactor, and would also serve equally well as the reaction framework for the reuse of unreacted hydrogen peroxide as recited in instant claim 24. Instant claims 25 and 27 all recite operational parameters dictated by the physical properties of the distillates (i.e. pv=nRt) and the design selections known for the dividing wall column. In the instant case the distillates are propylene oxide and

unreacted hydrogen peroxide targeted for at least 95% purity of the propylene oxide fraction at 10 to 70 theoretical plate resolution. Varying these, as well pressure and temperature parameters is obvious to, and standardly employed by, one of ordinary skill in the art for the purpose of routine optimization. This has been recognized as such by case law with In re Aller, Lacey, and Hall, 105 USPQ 233 where the opinion cited "Any chemist reading the article could logically assume that higher yields might be obtainable, and by experimentally varying the conditions ... could find the most productive conditions."

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rust et al. (US 2001/0052453 A1, pub date December 20, 2001) and in further view of Schutte et al. (US 2001/0021784 A1, pub date September 13, 2001) as applied to claim 29 above.

Claim 29 is drawn to a process for the intermediate isolation of propylene oxide formed by reaction of hydrogen peroxide with propylene, wherein the process comprises at least (i) reacting hydrogen peroxide and propylene to give a mixture of propylene oxide and unreacted hydrogen peroxide in an isothermal fixed-bed reactor, (ii) separating the unreacted hydrogen peroxide resulting from (i) by fractionation in a

dividing wall column into three boiling fractions with the propylene oxide taken off in the intermediate boiling fraction at the side offtake and the hydrogen peroxide taken off in the high boiling fraction at the bottom of the column, and (iii) reacting the hydrogen peroxide from (ii) with propylene with an adiabatic fixed bed reactor. Claims 29 further recites that the dividing wall column operate at a pressure from 0.5 to 5 bar, the side offtake temperature is from 10 to 60°C, the dividing wall column has from 10 to 70 theoretical plates, the key components in the purified propylene oxide be less than 5% by weight, that the propylene be brought into contact with a heterogeneous catalyst during reaction, the heterogeneous catalyst comprising zeolite TS-1, and that the dividing wall column comprise at least two thermally coupled distillation columns.

Rust et al. teaches all the elements and principles of the dividing wall distillation column. Clearly, Fig. 1 teaches diagamatically the introduction of a multicomponent mixture to the dividing wall system and the side off take of the intermediate-boiling fraction as well as the bottom offtake of the high boiling fraction (see also page 1, ¶0001 and page 2 ¶0032). Rust et al. does not however teach the catalyzed (TS-1) reaction of a hydroperoxide (hydrogen peroxide) with an organic compound (propylene) to form an oxirane (propylene oxide) in a fixed-bed reactor.

Schutte et al. teaches the reaction of hydrogen peroxide and propene (propylene) over a catalytic bed (fixed-bed) of TS-1 in a reactor to form propene oxide (propylene oxide) (see page 2, ¶0019, ¶0030 and ¶0031; page 3, ¶0032).

Clearly, Rust et al. combined with Schutte et al. teach all the functional elements of the instant claim 29. It would be obvious to one skilled in the art that the divided wall

apparatus and diagrammatic operation taught by Rust et al. is adaptable for the separation of any three component feed mixture that can reside in the vapor phase, as the divided wall column is in essence a thermally coupled two column system (see Rust et al., page 1 ¶0001, lines 31 through 32). Likewise, the reaction catalyzed by TS-1 taught by Schutte et al. can obviously be accommodated by either isothermal execution or adiabatic execution of the fixed bed reactor, and would also serve equally well as the reaction framework for the reuse of unreacted hydrogen peroxide as recited in instant claim 29. Instant claim 29 also recites operational parameters dictated by the physical properties of the distillates (i.e. pv=nRt) and the design selections known for the dividing wall column. In the instant case the distillates are propylene oxide and unreacted hydrogen peroxide targeted for at least 95% purity of the propylene oxide fraction at 10 to 70 theoretical plate resolution. Varying these, as well pressure and temperature parameters is obvious to, and standardly employed by, one of ordinary skill in the art for the purpose of routine optimization. This has been recognized as such by case law with In re Aller, Lacey, and Hall, 105 USPQ 233 where the opinion cited "Any chemist reading the article could logically assume that higher yields might be obtainable, and by experimentally varying the conditions ... could find the most productive conditions."

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 30 is drawn to an apparatus for carrying out the continuous process for the intermediate isolation of the oxirane formed by reaction of a hydroperoxide with an organic compound, wherein the process comprises at least (i) reacting the hydroperoxide and the organic compound with an isothermal fixed-bed reactor to give a mixture of reacted organic compound and unreacted hydroperoxide, (ii) separating the unreacted hydroperoxide from the mixture using a dividing wall column having one or two side offtakes and at least two thermally coupled columns, and (iii) reacting the hydroperoxide from (ii) with the organic compound with an adiabatic fixed bed reactor.

While the instant disclosure teaches the dividing wall distillation system and processes of reaction, there is no clear description of "an apparatus" that comprises all the claimed processes that would allow one skilled in the art the make and use said apparatus. Page 20, lines 1 through 7 state "*In a preferred embodiment of an apparatus for carrying out a continuously operated process for the intermediate isolation of the oxirane formed in the oxirane synthesis by reaction of a hydroperoxide with an organic compound, the apparatus for preparing the oxirane comprises at least one isothermal reactor and one adiabatic reactor for carrying out the steps (i) and (iii) and a separation apparatus for the step (ii), where the separation apparatus comprises a*

dividing wall column having one or two side offtakes or at least two thermally coupled columns." Clearly individual apparatus are discussed (i.e. dividing wall column, fixed-bed reactors, etc.,). However, a single unified "apparatus" that incorporates all processes is not described in either text or drawing. Such an apparatus description would be inclusive of the details of interfacing and controlling subsystems of such an apparatus (i.e. pressure control, flow control, etc.,).

Claim Objections

10. Claim 17 objected to because of the following informalities: Item (ii) of claim 17 references the mixture as defined in claim 1 where claim 1 has been canceled by Applicant. Appropriate correction is required.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Gallis whose telephone number is 571-272-9068. The examiner can normally be reached on Mon-Fri 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet Andres can be reached on 571-272-1600. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David E. Gallis
Patent Examiner

BERNARD DENTZ
PRIMARY EXAMINER